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British Society for the History of Pharmacy
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# British Society for the History of Pharmacy

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The British Society for the History of Pharmacy was formed in 1967 under the aegis of the Pharmaceutical Society of Great Britain, having originated from its History of Pharmacy Committee.

BSHP seeks to act as a focus for the development of all areas of the history of Pharmacy, from the works of the ancient apothecary to today's ever changing role of the community, hospital, wholesale or industrial pharmacist. Membership is open to all interested in the aims of BSHP.

## Aims

Promotion of historical studies related to pharmacy.
Advancement of knowledge and propagation of understanding of the history of pharmacy.
Publication of the research work of pharmaceutical historians.
Preservation of pharmaceutical artefacts and historic pharmacies.
Support for the work of relevant museums and offering advice on establishment of other pharmaceutical exhibits and on the preservation of pharmacies.
Co-operation with related professions and local historians on medico-pharmaceutical topics of mutual interest.

## Pharmaceutical Historian

The *Pharmaceutical Historian* has been published since 1967, at first intermittently, but on a regular quarterly basis from 1972. Issues generally comprise 16 or 20 pages and cover.

An **index** for the years 1967-1995 was published in 1998, for 1996-2000 in 2000, for 2001-2005 in December 2005 and for 2006-2010 in December 2010. They can be viewed on the website.

Papers, short communications and letters in English on any aspect of the history of pharmacy are welcome and should be sent to the address above or by email to *ainley.wade @easynet.co.uk*

Any illustrations are converted to monochrome for printing. Further details of requirements can be found on the website *www.bshp.org* under Publications.

## Membership

**Membership costs £20.00 per annum and includes:**

Four issues of the *Pharmaceutical Historian.*

Regular meetings, with guest speakers, usually in November, February and May.

Visits to places of historic interest, museums, collections, botanical gardens, etc.

Annual Conference, usually in March/April.

Free use of the Royal Pharmaceutical Society of Great Britain's library facilities for research.

Help in historical research and with the identification of artefacts.

Affiliation to the International Society for the History of Pharmacy (ISHP).

Affiliation to the British Society for the History of Medicine (BSHM).

*Application forms* are available from the Honorary Secretary at the address above or on *www.bshp.org*

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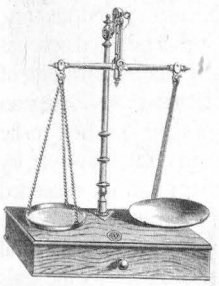

# PHARMACEUTICAL HISTORIAN

Editor: Ainley Wade, BPharm, MPhil, FRPharmS
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www.bshp.org

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## Diary

Please note that unless otherwise stated, the evening meetings will be held at the new RPS headquarters, 66-68 East Smithfield, London E1W 1AW, starting with refreshments at 5.00 pm.

**Monday 18 April 2016**
'Pharmacy History: sources and resources'. BSHP afternoon meeting with four speakers at the Wellcome Foundation, Gibbs Building, 215 Euston Road, London NW1 2BE. Details for ticket applications to be circulated.

**Monday 23 May 2016**
'Henry Wellcome, pharmacist' by Ross Macfarlane, Research Engagement Officer, Wellcome Library, at RPS, 66 East Smithfield, London E1W 1AW, 5.00 for 5.30.

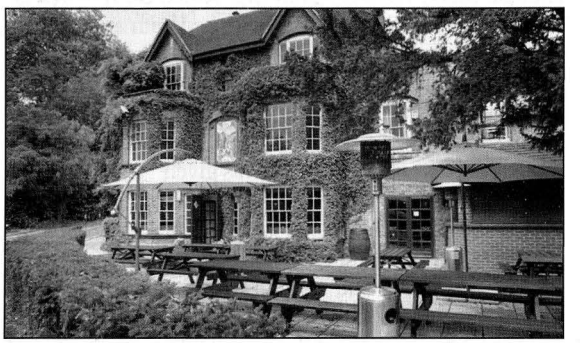
**Wednesday 6 July 2016**
Visit to The Linnean Society of London, Burlington House, Piccadilly, London W1J 0BF. Details to be circulated.

**Monday 10 October 2016**
Expedition medicine by Dr Henry Guly at RPS, 66 East Smithfield, London E1W 1AW, 5.00 for 5.30

BSHP has its own **Facebook** page. 'Like' us to share information on events, news items, resources, research and other pharmacy history topics from BSHP and related organisations.

## BSHP Annual Spring Conference 2016

will be held **1-3 April 2016 at** Best Western Plus **Reading Moat House Hotel,** Mill Lane, Sindlesham, Wokingham, Berks RG41 5DG



The overall theme of the weekend is ***Education*** and speakers on Saturday will deal with the history of pharmaceutical education in various countries and institutions. There will be a visit to the Reading Medical Museum in the afternoon and a dinner in the evening.

On Sunday, after the AGM, Anastasia Schulze will present the Burnby Award lecture on 'The Benzodiazepine Crisis 1960-1990'. There will also be an audience participation session based on your pharmaceutical memories.

Was there a charismatic tutor or pharmacist mentor during your early career, or some aspect of the undergraduate syllabus, which made you into a better pharmacist over and above the information conveyed?

Are the same stimuli still available to young pharmacists today and if not how can we make sure the same effect is produced within today's high-powered academic training?

To stimulate discussion, three members will give a short presentation on their experiences and then it will be over to you. We will record the session and try and work it up into an article for the Historian but it would help if you bring your ideas on paper to help with the interpretation of the tape.

For further information, contact Shirley Ellis at shirleyellis@shirlellis.plus.com



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# A chemical study of a 'Terra Sigillata' medicinal tablet from a late 17th century Italian medicine chest

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**Camborne School of Mines, University of Exeter in Cornwall, Tremough Campus, Penryn, Cornwall, UK

It is probable that Wendel Thumblardt was one of the first volunteers to be utilised in a drug trial. He was a condemned-to-hang robber, in Langenburg (Germany) of the late 16th century. After sentence was passed on him he made an unusual proposal to the authorities. That they would give him a lethal dose of poison, followed by a well known (but not reliably tested on a human being) poison antidote called *Terra Sigillata* (lit. 'sealed earth' – that is, some moist clay that had been stamped with an image of a seal). If he survived he would go free, if he died then the poison antidote would have failed (and he was going to die anyway).[1,2] The authorities agreed to his proposal.

Thus on the 25th January 1581, in the presence of various nobles and notables, he was given ' … a dram and a half of Mercurie Sublimate, mingled with conserve of Roses, and immediately after a dram of the *Terra Sigillata* in olde wine'. The amount of poison (mercuric chloride, $HgCl_2$) was more than enough to kill an average-sized man. Then, though the poison did ' … extremely torment and vexe him; yet in the end the medicine overcame it'.[1,2,3] The authorities kept their side of the proposal and he was freed.

Being poisoned was an occupational hazard for the elite of Europe for centuries. An antidote that *worked* was much sought after; thus an offer of a controlled trial on a human being using the well known *Terra Sigillata* poison antidote was an offer that was always going to be readily accepted.

Unsurprisingly there were many different poison antidotes available in past centuries and whilst many were herbal (i.e. organic), some were earth-based (i.e. inorganic).[4] Some of the latter were based on clays or clay minerals.[5] The layer-type structures of clay minerals, with their adjustable distances between layers that give variable amounts of space for small molecules (such as water) and ions, gives rise to their absorption and ion-exchange properties. These properties are in turn responsible for various internal medicinal uses (past and present), such as for treating diarrhoea, stomach-ache, acid indigestion, a dietary deficiency, and as a detoxifying agent (i.e. poison antidote).[1,4,6,7,8]

Thus, whilst medicinal clays have been recorded for almost five millennia (and probably known, but unrecorded, for much longer), the *terra sigillata* tablets (or sometimes troches, pastilles, cakes, lozenges, coins, usually circular in shape and red/yellow/white in colour) have 'only' been recorded for about two millennia. Both Dioscorides (c. 40–90 CE) and Pliny the Elder (23–79 CE) recorded the tablets' existence in the first century. Galen of Pergamon (c. 130–210) gives a detailed account of his visit in 167 to a well known manufacturing site of the tablets on the Greek island of Lemnos (NE Aegean sea). The Lemnos tablets were possibly the first to be made and did become the most well known. However, by the 14th century the demand for them had far exceeded supply and so several European countries had taken to making their own tablets using cheaply available local clays. Each country adopted their own images for the seals used, although these images did sometimes change over time. So, by the early 17th century there were many versions of *terra sigillata* tablets available, some unfortunately being counterfeit. One of the best known of these alternative tablets were those from Silesia (then part of the Hapsburg Empire and now mostly in SW Poland) and were called *Terra Silesiaca*. Examples of other countries making their own tablets were: other Greek islands (e.g. Chios, Samos and Kimolos), Malta, Turkey (which includes their taking over the island of Lemnos in 1456), Armenia, France, England, Germany and Italy.[3,9,10] Further information on the composition and uses of some *terra sigillata* tablets (and their associated clays) will be given in the later Discussion section.

We were recently fortunate to be allowed access to a well provenanced late 17th century Italian medicine chest with a view to removing small amounts of some of the medicines for chemical analysis. The chest was given, in December 1698, to John Clerk of Penicuik (1676–1755, and second baronet from 1722) just before his departure from the Florentine court of Cosimo III (1642–1723), Grand Duke of Tuscany (reigned from 1670). The chest was later described, by its new owner, as 'a Box of chymical medicines'.[11,12,13] Figure 1 shows the top tray of the opened chest, and Figure 2 shows two of the medicinal tablets under study.

## Analytical Methods and Results

In the left corner of the top tray of the chest is a small gold-coloured container (see Fig. 1 and in the background of Fig. 2). The tablets inside this container

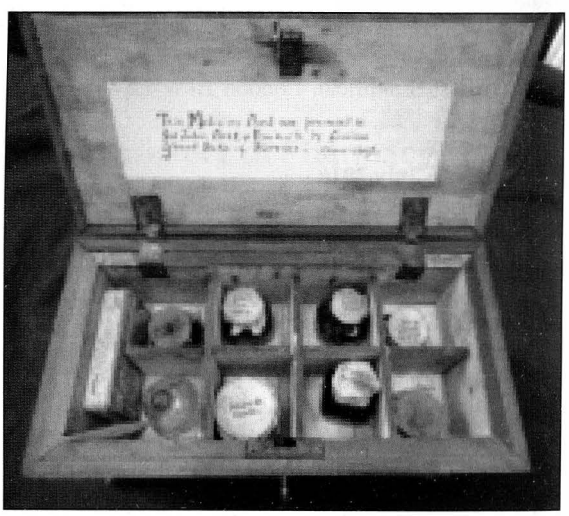

**Figure 1.** The opened medicine chest.



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**Figure 2** The medicinal tablets and their two seals.

are between 18 and 20 mm in diameter and 2 to 3 mm in thickness. We estimate that a whole tablet weighs approx. two grams (i.e. almost exactly half a dram). Already broken-off small fragments of these grey-white tablets were ground to give a light yellow-brown powder, which was then used in the subsequent chemical analyses.

The analytical techniques used were: LVSEM (Low Vacuum Scanning Electron Microscopy), XRPD (X-Ray Powder Diffraction) and QEMSCAN (Quantitative Evaluation of Minerals using Scanning Electron Microscopy). The first technique gives a quantitative summary of the elements present (down to and including an atomic number of 6, i.e. carbon); the second gives semi-quantitative data on the crystalline compounds present and the third technique gives quantitative data on the inorganic/mineral compounds present (regardless of if they are crystalline or amorphous).[14]

The analytical results for our sample (designated 'P9') are given below in the following way: first the LVSEM results in decreasing order of elemental weight percent (with the elements in ordinary brackets being at less than 1% each, and the element in square brackets was only later found in a 'spot' scan, where a 'spot' scan is an analysis over a circular 'spot' of only 2 to 3 μm in diameter, compared to a normal ('area') scan done over a rectangle of between 200 to 400 μm a side), then the combined results of QEMSCAN and XRPD. The former technique sometimes only identifies a *group* of inorganic compounds, whilst the latter technique can usually identify the *actual* inorganic compound present from this group. Thus we have given the QEMSCAN results first and with the associated XRPD results given in subsequent brackets.

**LVSEM**: O, Si, Al, Fe, K, Mg (Ti, Na) [Sn]

**QEMSCAN** (XRPD): Kaolinite 66.9% [an aluminium silicate, $Al_2Si_2O_5(OH)_4$];
Muscovite or Illite 16.0% [Muscovite, $K(Mg,Al)_{2.04}(Si_{3.34}Al_{0.66})O_{10}(OH)_2$];
Chlorite (Group) 10.2% [most likely Clinochlore, $(Mg,Fe)_5Al_2Si_3O_{10}(OH)_8$];
Biotite 2.4% [$K(Mg,Fe)_3(AlSi_3O_{10})(OH)_2$];
a K-feldspar 1.7% (Microcline, $KAlSi_3O_8$);
Rutile 0.9% (Titanium oxide, $TiO_2$);
a plagioclase feldspar 0.9% (probably Albite, $NaAlSi_3O_8$);
Quartz 0.5% (Silicon oxide, $SiO_2$);
an Iron oxide/carbonate 0.4% [most likely Goethite, FeO(OH)];
with the remaining 0.1% made up of: a Mg-silicate [most likely Talc, $Mg_3Si_4O_{10}(OH)_2$], Cassiterite (a Tin oxide, $SnO_2$), and several other compounds (calcite and various silicates) each present in 'trace' amounts [i.e. at less than 100 ppm (0.01%)].

## Discussion

Only a few chemical analyses of actual *terra sigillata* tablets have been done. About a century ago a small sample of a 16th century *terra sigillata* tablet from Lemnos was analysed and the results given as: silicates 37.23%; calcium oxide 22.90%; aluminium oxide 13.51%; ferric oxide 4.08%; magnesia and alkali oxides 1.50%; water and carbon dioxide 17.72%; moisture 3.06%.[10] These results were later interpreted to give the sample's approximate composition as: calcite 40%; quartz 24%; illite 20%; kaolinite 13%; water 3%.[2]

In 1945 a paper was published on the analysis of a 'grey-violet tablet' that was an example of *Terra miraculosa Saxoniae* (miracle earth from Saxony, Germany). However, it is unclear if the tablet was actually stamped with a seal. Its composition was given as: two-thirds kaolinite, with the remaining one-third consisting of quartz, (a) mica and limonite ($FeO.OH.nH_2O$). [2]

In 1960 a report was written on the chemical analysis of powders from seven troches of *terra sigillata* from the Hans Sloane Collection (all of which were originally in the British Museum, but these and other mineralogical samples were later transferred to the National History Museum). One sample had illite, one montmorillonite, one well crystallised kaolinite, two disordered kaolinite and one an unspecified type of kaolinite as the dominant clay mineral present. The seventh sample was described as being identical to one of the above six samples, but exactly *which* sample is unknown.[2] It is assumed that these seven troches were some of the fifteen troches of bright pinkish coloured *terra sigillata* tablets from Lemnos and dated to the 18th century that were found in one (of two) drawer(s) of mineral pharmaceutical specimens in the Sloane Collection (and now on display at the Natural History Museum).[15]

A 1973 paper gave chemical composition data on 21 'disks' of *terra sigillata* from Lower Slesia/Silesia. They are described as being various colours: yellow, brown and one being black. Their composition was said to be based mainly on montmorillonite and illite; with some containing bentonite (altered volcanic ash, with its major component being montmorillonite) and others kaolinite.[16] No date of their manufacture was given.

The most recent analysis was published in 1997 and was a chemical study of two *terra sigillata* tablets from the Greek island of Samos (about 300 km SSE of Lemnos). The samples were both from a private



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collection and their dates had been estimated to be of the 5th to 6th century BC, which, if confirmed, would make them the oldest known examples of such tablets. One sample was red and one white. Both were found to have had organic matter mixed with soil. The latter was consistent with soils from Samos, but for the white sample could also match some soils of the Anatolian peninsula (i.e. what is now approximately the western two-thirds of Turkey).

The authors of the paper used the analytical techniques of EDX (energy dispersive x-ray micro-analysis for elemental determination) and x-ray diffraction analysis. Using their results from the latter technique we have estimated the percentages of the compounds present in both samples. For the red sample (with our approximate percentages given in brackets): quartz (66), kaolinite (4), illite (3), illite-smectite (27); the sample's red colour was probably given by the presence of a small amount of hematite ($Fe_2O_3$). Similarly, for the white sample: quartz (42), gypsum ($CaSO_4.2H_2O$) (30), kaolinite (24) and illite (4).[17]

Additionally, clays have been analysed from modern-day deposits in regions where the tablets were known to have been made in centuries past. However, past surface clay deposits will have disappeared or changed over such time scales from both usage and weathering. Even below the surface clay deposits of the past could have been chemically altered or have been significantly depleted by human activity over time. Samples from various modern-day clay deposits on the island of Lemnos have been chemically studied. One such study found that their clay samples were 'rich in smectite and specifically in Ca-montmorillonite'.[18] A second later study found montmorillonite in both their red and white clay samples.[19]

An interesting hypothesis has been proposed as part of a determination of the composition of old *terra sigillata* tablets made from material at a particular deposit on Lemnos. Using several analyses of nearby rocks and a consideration of the local water (which flowed over this particular deposit for some time prior to clay samples being taken), plus by considering documentary evidence of tablet production and its properties, it was *reasoned* that the composition of old tablets made from material at this deposit would have been (approximate percentages given in brackets): montmorillonite (40), a kaolin group clay mineral (35), alum ($Al_2(SO_4)_3.17H_2O$, possibly containing some potassium) (20) and hematite (5). The 'interesting hypothesis' being that the flowing water, over time, added the alum to the clay deposit and where the authors identify it as a major active ingredient (acting as an astringent).[9,10]

On comparing the composition of our tablet with the results from the above mentioned five publications it can be seen that none of their results are an *exact* match for ours. The first and fifth have percentage amounts given for the compounds present, but contain relatively large amounts of calcium compounds (calcite and gypsum respectively) where our sample has calcite only in a 'trace' amount. Whilst the second paper's sample does have an exact match for the amount of kaolinite present, its mica is not identified and its quartz percentage must be larger than in our sample. Some of the third and fourth papers' tablets do have as their major component kaolinite, but the remaining compounds in these samples are unknown. The studies done on Lemnos clay deposit samples all show montmorillonite (which is not found in our sample) as the dominant compound present. Finally, the reasoned study for the composition of old Lemnos *terra sigillata* tablets does give kaolin (where the most commonly found member of this group of clay minerals is kaolinite[5]) as being present in a significant amount, but it also lists montmorillonite and alum as being present, both of which are *not* found in our sample.

**Figure 3.** *Terra Sigillata* tablets from the collection of the Museo di Arte Sanitaria, Rome.

At the time period of the existence of our medicine chest (late 17th century) many European countries had found local clay deposits with which to make their own (distinctively sealed) *terra sigillata* tablets. Thus we feel that a local (i.e Tuscan) clay source for our sample is probable. Tablets variously called *Terrae Sigillatae Florentina* (sealed earths of Florence), *Terra Florentina* (earth of Florence) and *Terra Magni Ducis/Terra del Gran Duca* (earth of the Magnificent/Great Duke) are known to have existed and are all thought to be made from local clay, which was said to excavated at 'various sites in Tuscany' and also from a surface deposit 'around Florence'.[10] Tablets said to be sealed with the arms of the Medici family are shown in Figure 3; they have been dated to the 17th century and are said to have been made of clay from the island of Elba.[20] Other tablets with the Medici seal come from the nearby Giglio (Lily) island.[16] Both of these islands are part of Tuscany.

Using as input the three major minerals found in our sample (i.e. kaolinite, muscovite and a member of the Chlorite Group) to the search engine of a mineral website/database we found several Tuscan modern-day mines that are listed as having them present. Only one of these mines is known to have been used in the (late) 17th century (the Bottino mine in the Apuan Alps, Lucca Province of Tuscany, and approximately 100 km NW of Florence). Also the island of Elba was known to have had several excavated sites in this time period, and the one



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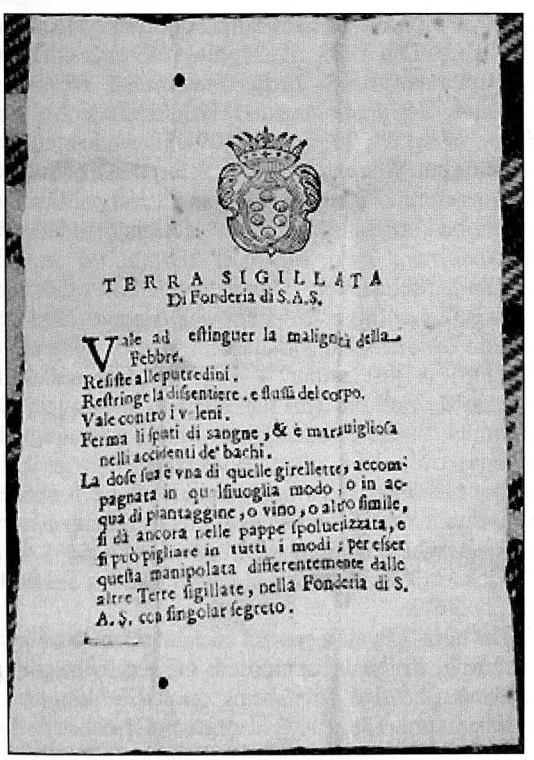
(the Calamita mine) we identified as probably having all three minerals in the present day *may* have been so used in the past.[21]

It is known that in the time of Cosimo I (1519–1574) as (1st) Grand Duke of Tuscany there were experiments to make porcelain, using various sources of clay (both local and from further afield in Europe). These experiments probably started in 1565, in a specially built pottery in Florence. After ten years the Grand Duke (now Francesco I, 1541–1587) succeeded in making a proto-porcelain, which eventually became known as Medici porcelain. Small scale production started in 1576 and continued until about 1610. The kilns for this production were situated at the Casino di San Marco (probably where the Museum of San Marco now stands, and which is about 1200 m north of the present-day Uffizi Gallery) and in the Boboli Gardens (which is behind the Pitti Palace; which in turn is about 650 m, over the Ponte Vecchio, from the Uffizi gallery).[22] It is possible that one of the clay sources tried for porcelain making and which failed at this enterprise was re-used by the Grand Duke as a medicinal clay in *terra sigillata* tablets.

The coat of arms shown on the tablet at the bottom of Fig. 3 is said to be that of the Medici family. The crown above a shield containing six balls, and outside the shield 'M' and 'R' on the left and 'D' and 'VI' on the right, are all the same as shown on our tablet (see right hand image of Fig. 2). These symbols *may* stand for 'Magni' (Magnificent), 'Duci' (Duke), 'Regno' (reign) and the 'VI' possibly for the fact that Cosimo III was the sixth Grand Duke of Tuscany. Our tablets, like those in Fig. 3 and others of at least the 17th and 18th centuries, had *two* seals stamped on each original piece of moist clay, front and back, before being left to harden.


TERRA SIGILLATA
Di Fonderia di S.A.S.

Vale ad eſtinguer la maligoità della Febbre.
Reſiſte alle putredini.
Reſtringe la diſenteriere, e fluſſi del corpo.
Vale contro i veleni.
Ferma li ſputi di sangne, & è marauigliosa nelli accidenti de' bachi.
La doſe ſarà vna di quelle girellette, accompagnata in qualſiuoglia modo, o in acqua di piantaggine, o vino, o altro ſimile, ſi dà ancora nelle pappe ſpolueriZZata, e ſi può pigliare in tutti i modi; per eſſer queſta manipolata differentemente dalle altre Terre ſigillate, nella Fonderia di S. A. S. con ſingolar ſegreto.

**Figure 4.** 'Dosage leaflet from John Clerk of Penicuik's medicine chest.

As to the other seal on our tablets (see left hand image of Fig. 2), it is similar to the one seen at the top of Fig. 4. This latter image is taken to be the seal for the Grand Duke's fonderia (foundry). A translation of Fig. 4, a 'dosage leaflet' for *Terra Sigillata* from an empty space in the bottom drawer of our medicine chest (and where this leaflet does *not* have the usually found 'imprint' of a glass container on it and so it is assumed that our tablets were always in the gold-coloured container of the top drawer) is given below (and where the words in square brackets have been added by us):

TERRA SIGILLATA
Of the Fonderia [Foundry] of S. A. S.
It is of use for extinguishing the evil of fever.
It is resistant to putrescence.
It reduces dysentery and body fluids.
It is of use against poisons.
It stops spitting of blood and it is wonderful in illnesses involving worms.
Its dosage is one of those round pastilles, taken in whichever way, either with water of *Plantago major* [a herbal tea?], or wine, or other similar [liquids].
It can be added to mushed food, powdered and it can be taken in any [other] way;
as this [clay] is processed differently from all the other 'terre sigillate' in the Foundry of S.A.S., with a special secret [recipe?].

[[S.A.S. is Sua Altezza Serenissima (His Most Serene Highness)]

The fonderia of the Grand Dukes of Tuscany was their workshop/laboratory for research into and the production of various materials relating to the Arts and to Alchemy. In addition to the initial furnaces for smelting and forging metals, there were added over time facilities for studying and making: medicines, porcelain, cabinets, confectionery, clocks and other mechanical devices, and for the cutting of precious/semi-precious stones. Its location varied over time; it being found, in chronological (if sometimes overlapping) order, in the Palazzo Vecchio (located at the NE end of the Uffizi gallery), the Casino di San Marco and in what is now the Uffizi gallery itself. However, from the time of the reign of Cosimo II (1590–1621; reigned from 1610) its prestige and facilities decreased and under his successor (Ferdinando II, 1610–70) its budget, and hence output, was increasingly reduced. Under Cosimo III the fonderia was moved to the Palazzo Pitti where it apparently functioned only as a pharmacy.[23,24] The very existence of our chest and its contents confirms the above and also suggests an associated workshop for making the medicine chests and their distinctive 'dosage leaflets'.

Sometimes, various 'additives' were added to the moist clay before they were stamped and left to harden. Perhaps



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the most (in)famous of these is the goats blood, said by Dioscorides (in the first century CE) to have been added to the clay by a priestess on Lemnos. When Galen, about a hundred years later, mentioned it to the islanders it was greeted with laughter and regarded as 'a joke'.[19] More reliably, it is known that the *terra sigillata* clay was later sometimes used as one ingredient of a medicinal recipe. One example is (where the extra information in brackets has been added by us): clay plus 'mineral unicorn' (possibly a whitish earth from Silesia[3]), 'oriental bezoar stone' (an accretion found in the stomach of a Persian goat), 'alcohol from oriental mother-of-pearl' (mother-of-pearl is mostly aragonite, a form of calcium carbonate), 'Diaphor of antimony' (this is said to be a mixture of antimonic acid and its potassium salt, and where a 'Diaphoretic' drug is one that induces sweating), 'confection of hyacinth berries' and 'gelatine of Italian vipers'. Such recipes were used, in the late medieval period at least, against snake and mad dog bites, the plague, fevers and 'pestilence'.[16] There is no chemical evidence of any such additive(s) being added to our sample.

The various medicinal uses of *terra sigillata* tablets and their associated clays have already been mentioned (see Introduction and above), and uses for *our* tablets are given in its 'dosage leaflet' (Fig. 4). Recent studies into the medicinal uses of clays have shown that various kaolins can be used effectively: as haemostatic wound dressings, to aid blood clotting (kaolinite); in (targeted) drug delivery, as a carrier (halloysite); and some (currently only found using a mixture of kaolins and other clays) are antibacterial. Toxicity from kaolins is rare if ingested, but fibrosis can occur from long-term exposure (inhalation).[25]

## Conclusions

Our sample consists almost entirely of silicates. Its three major components are kaolinite (67%), muscovite (16%) and a member of the Chlorite Group of silicate minerals (probably clinochlore) (10%); and with the other compounds found shows that the original material was almost certainly a naturally occurring clay. As to exactly *where* this clay was found, there are several possibilities, with the most likely in our opinion being a local (Tuscan) source. Surface or deeper deposits near Florence are a possibility, but the deposits on the islands of Elba or The Lily seem to us to be the more likely. The Grand Dukes of Tuscany *may* have been 're-cycling' a clay from a failed porcelain-making experiment, from when the first such experiments were done (i.e. c. 1565–1575). It is thought that the clay for *our* tablets would have arrived at the fonderia for stamping with seals only a short time before our medicine chest was given to John Clerk of Penicuik in late 1698.

The chemical composition, size, shape, colour and identifiable seals of our tablets, plus the presence of a 'dosage leaflet' and the excellent provenance of the medicine chest, shows us that they are genuine *terra sigillata* tablets. Thus, they would have been expected to work against ingested poisons by their new owner. As far as we are aware the new owner of the medicine chest, or any of his descendants, never so used a tablet. However, given that one tablet is only about *half* a dram then taking one in 'olde wine' would probably *not* have been enough to have saved the life of one Wendel Thumblardt.


## Acknowledgements

We would like to thank the following people for their help with this project: Sir Robert Clerk of Penicuik for allowing access to the medicine chest and for supplying us with a small amount of the sample; Ms Sally Pointer (an Independent Experimental Archaeologist) for taking the photographs used for Figures 1, 2 and 4; Professor G Giacobini (University of Turin) for supplying the image used for Figure 3 and for information on the tablets shown; Dr Anita Santorum for translations of old and modern-day Italian; and to the staff of the Chemical and Materials Analysis Unit (University of Newcastle, UK) for the experimental LVSEM and XRPD work mentioned in this article.



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minerals. The term 'clay mineral' refers to a sub-division of the Phyllosilicates family and are essentially hydrated aluminium or magnesium silicates with other elements sometimes present (such as Fe, Ca, Na and K). Examples of clay minerals are: Kaolinite, Montmorillonite (sometimes called Smectite), Illite, Halloysite, Talc and Pyrophyllite. Clay minerals are sometimes divided into Groups, such as the Kaolin Group --- which includes kaolinite, halloysite, dickite and nacrite (with the first two being the most common). Also present in a particular clay can be a variety of other minerals, such as: quartz, (a) mica, (a) feldspar, various oxides and calcite/other carbonates.

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# A study of an ointment from a late 17th century Italian medicine chest

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Being burnt or scalded must have been a very common occurrence before the advent of electrical lighting and closed oven cooking. The following burns treatments (with one important addition, which will be mentioned separately) have all been variously used over time: applying cooling lotions (these include the use of cold running water, which is still recommended, and the application of *fresh human urine, which though efficacious, is not now totally culturally acceptable*); application of heat to the burnt area (to remove moisture and aid fluid removal); covering the burn wound with material that was transparent, porous and which could be readily sterilised (e.g. cellophane); surgery, initially to remove loose skin/flesh and later for skin grafting/plastic surgery; and treating the patient for shock by keeping them warm and drinking fluids.[1,2,3] The addition is of course the application to the affected area of the skin one of a vast array of unguents/ointments, salves and sticky balms. These are what we will mainly cover in this article.

The earliest known written record of burn medicines is in the Ebers papyrus of ancient Egypt. It was written in c.1550 BC, but probably contains older remedies. The papyrus contains a section entitled 'Beginning of the remedies for a burn'. The remedies given include the use of (either individually or with other materials): honey; copper flakes; malachite (basic copper carbonate); fat; oil; animal excrement; black mud; and a variety of plants. The final remedy listed reads: 'Another: barley bread, oil/fat and salt, mixed into one. Bandage with it often to make him well immediately. A true thing. I have seen it happen for me.'[4]

Herbal remedies were often used in the medieval period of Western Europe (i.e. c.500 to c.1500 AD). Two such examples for burns are: a) 'take the plant [Greater Celandine (Chelidonium maius)] and pound it with goat's grease, and lay it on the burn'; and b) 'for a bad burn, take the roots of ancusa [alkanet] plant soaked in oil and then mixed with wax like you would to make a plaster or poultice. Apply this to the burns, and it will heal them in a wonderful manner' [with words in square brackets added by the author].[5]

In the early modern period of Western Europe a famous treatise on the classification, prognosis and treatment of burns was published, written in 1607 by Wilhelm Fabry (1560–1634), using his latinised name of Guilhelmus Fabricus Hildanus, when he was a surgeon in the small town of Payerne (in what became the Vaud region of Switzerland). His recipes were simple, pragmatic (case study details of their use were sometimes given) and free of the poly-pharmacy commonly used at the time. Two examples are: a) raw onions (1.5 oz), salt (1.0 oz), white and blue soap (Castilian soap) (1.0 oz), mixed in a mortar and made into an ointment using rose and sweet almond oils; and b) 'Basilicon Ointment', made from yellow wax, black pitch, resin (0.5 lb each) and olive oil as required. The first was for small burns and the second for later blisters; and where 12 ozs = 1 pound, 1 oz = 8 drams/drachms = 31.1 g.[6]

In the present day folk/alternative medicines are still used as skin balms for burns. In a recent study of zoo-therapeutic remedies used in the Mediterranean (in the interior and mountainous regions of Italy, Albania, Serbia, Croatia and Romania) it was found that honey and (separately) cow/dog faeces were applied to burns.[7] Both of these remedies were known to and used by the ancient Egyptians of over three millennia ago.

In orthodox western medicine of the present day burn wound management includes oral or intravenous hydration, topical application of various antiseptic/antimicrobial/anti-inflammatory creams or ointments with appropriate dressings, and oral antibiotics and analgesic medicines. Worldwide each year over 300,000 people die from severe burns. To preserve our largest organ, the skin, as much as possible should be done to protect and heal it from the 'slings and arrows' of misfortune. One such way is to use the best possible material(s) for topical application to the affected skin, and new research is being done on various natural bio-resources for their antimicrobial, anti-inflammatory and stimulation of new cell growth abilities. Examples include honey, *Aloe vera/Aloe barbadensis*, and *Hypericum perforatum* (St John's wort), which have all been known for their wound-healing properties for many years. Extracts from various fungi may well also prove valuable in wound care.[8]

Only *some* of the very many skin balms used for burns over the last few millennia have been mentioned above, and further information on additional relevant historical recipes will be given in the later Discussion and Conclusions section. They are found in the literature and also where old residues, or their modern-day reproductions, have had analytical chemistry techniques applied to them.

I was recently fortunate to be allowed access to a well provenanced late 17th century Italian medicine chest with a view to removing small amounts of some of the medicines for chemical analysis. The chest was given, in December 1698, to John Clerk of Penicuik (1676–1755, and second baronet from 1722) just before his departure from the Florentine court of Cosimo III (1642–1723), Grand Duke of Tuscany (reigned from 1670). The chest was later described, by its new owner, as 'a Box of chymical medicines'.[9,10,11] Figure 1 shows the top tray of the opened chest, Figure 2 shows the bottom tray of the chest, and Fig. 3 shows the (covered) glass container and a 'dosage leaflet' for the deep red ointment under study.

## Analytical Methods and Results

The analytical techniques used were: LVSEM (Low Vacuum Scanning Electron Microscopy) and two GC-MS (Gas Chromatography-Mass Spectrometry) analyses. The first technique gives a quantitative summary of the elements present (down to and including



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**Figure 1.** The opened medicine chest, showing the top drawer

**Figure 2.** The bottom drawer of the medicine chest

an atomic number of 6, i.e. carbon) and the second technique gives data on the organic compounds present.[12]

The analytical results for our sample (designated 'P17') are given below: first the LVSEM results in decreasing order of elemental weight percent and then a summary of the GC-MS results.

**LVSEM: C, O**

**GC-MS:** Two analyses were done; Total Ion Chromatogram (TIC) GC-MS and Fatty Acid Methyl Esterification (FAME) GC-MS. Their results are summarised below, with additional data given in the Endnote.[13]

*TIC GC-MS:* Ten of the seventeen compounds identified were saturated carboxylic (fatty) acids (FAs, to a total of almost 90%), ranging from C8:0 to C20:0 and with C16:0 (common name palmitic acid, P) and C18:0 (common name stearic acid, S) having the largest amounts present (56.6% and 20.1% respectively). The remainder consisted of two aldehydes (C8 and C9, to a total of 1.9%), three dicarboxylic acids (C8:0, C9:0 and C10:0, to a total of 4.1%) and two carboxylic acid isomers (of C18:1 and C18:2, to a total of 3.6%).

*FAME GC-MS:* Ten of the thirty compounds identified were saturated straight-chain carboxylic acids (C8/9/10/12/14/16/17/18/20/22:0, to a total of 69.3%) and where the palmitic and stearic acids have the highest amounts present (35.2% and 25.4% respectively). Additionally there were: seven dicarboxylic acids (C6:0 to C12:0, to a total of about 23.5% and where the C9:0 acid had the largest amount, at 9.8%); three C18:2 isomers (to a total of 1.2%); seven oxo-/dimethoxy-/hydroxy-/dihydroxy- derivatives of various saturated fatty acids (to a total of 2.4%); two branched saturated fatty acids (of C16:0 and C17:0, at 2.4% and 0.2% respectively) and a trans-isomer of C18:1 (estimated to be at about 1%).

Interpretation of the GC-MS data will be done in the next section.

## Discussion and Conclusions

Not very many old medicinal residues have been analysed by modern analytical chemical techniques, and the number is even smaller for such residues where its use is known (from a convenient label/leaflet) or thought to be known (from provenance data or previous literature publications).

Two examples of chemical analyses of very old samples (about two millennia in age), where the exact medicinal (or possibly cosmetic) uses are uncertain, have been recently published. One, on a single sample from an Etruscan tomb (in Chiusi, Tuscany, Italy) dated to 150/125 to 100 BC, found evidence for a a vegetable oil (possibly moringa) mixed with two plant resins (mastic and pine).[14] The other article gives details of the analysis of seven residues in (four) bronze containers, which are part of a set of Roman-period surgical instruments and accessories held in the British Museum. Ingredients identified included: beeswax (some of which is probably 'Punic wax'), fat/oil, conifer resin, gum-derived sugars, elemental carbon and lead and zinc compounds.[15] In both these studies one of the analytical techniques used was GC-MS; which is usually ideal for the identification of a whole range of organic molecules, and at least some of their degradation products.

By the time we reach the late 19th century the previously commonly used beeswax had been largely replaced by the cheaper, and more readily available, petroleum products of paraffin wax/Vaseline. Also, the 'active ingredients' held in the basis were often mostly, or even entirely, inorganic. These can be identified by the analytical techniques of LVSEM and XRPD. Very recently we published an article on the composition of two such skin medicines, one for eczema and the other for 'dry skin' problems, where both contained lead and mercury compounds as the active ingredients in a petroleum basis.[16]

Residues of remedies, for burns/bruises/wound healing and various skin conditions, from Europe of the 16th and 17th centuries, have occasionally been found and chemically studied. These results can be directly compared to sample 'P17' in terms of usage, time/place of manufacture, chemical composition and degree of degradation.

One such example is an ointment residue found in the excavated remains of a Belgian castle and dated to between the second half of the 16th century and the early 17th century. Its organic fraction was studied mainly by the GC-MS analytical technique. Interpretation of all the collected data indicated that the original ointment had consisted of a lead plaster, beeswax and a small amount



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of gypsum ($CaSO_4.2H_2O$). A lead plaster is an impure lead soap, made by mixing a lead compound (such as litharge, PbO) with a vegetable oil (such as olive or almond oil) or with an animal fat. Such a remedy was known to have been used in this time period/place as an external dressing for bruises, sores or ulcers.[17]

Other examples, together with remedies reproduced from relevant old recipes, were recently studied by Pyrolysis–GC/MS. The four old ointment residues were obtained from labelled containers in the Aboca Museum (Sanseprolcro, Arezzo, Italy), and had been dated from the 16th and 17th centuries. The results showed the presence of, variously, in both old and new samples: beeswax, gums/resins, animal (pig) fat and vegetable oils. As expected some degradation of the old samples had occurred; and for the artificially aged (via ozonolysis) reproduced remedies a small degree of degradation was sometimes observed. Also, some of the known ingredients of the reproduced samples could not be identified (e.g. ground red rose petals extracts/rose water, turnip juice and various herbs). This gives some indication of how difficult it can be to correctly identify all the components of a medicinal remedy, especially when some of them have been changed over time by air (oxidation), water (hydrolysis) and general environmental contamination.[18]

My GC-MS data shows no evidence for the presence of wax (e.g. beeswax) or plant resin (e.g. pine resin) in our sample. It does show evidence for the presence of fat/oil. The main components of fats and oils are triacylyglycerides (TAGs); where each molecule is an ester of glycerol and three carboxylic (fatty) acids. These acids are of variable (carbon) chain length and can be saturated or unsaturated. In old fats and oils these TAG molecules are often at least partly hydrolysed to their component fatty acids (FAs). Such acids predominate in both of the GC-MS data sets (see above and associated Endnote); thus suggesting the presence in our original sample of one or more fat/oil. These FAs (and the TAGs prior to hydrolysis) can be subject to oxidation, and even degraded by any bacteria/microbes that may be present.

My sample was probably in a warm (estimated to be, usually, between 10 and 20° C) and dry closed environment, in a glass container, covered with tied-on vegetable parchment paper, in the medicine chest (see Fig. 1) for just over 300 years. Thus a degree of oxidation of the sample is to be expected from atmospheric oxygen, and any hydrolysis would be from the water which was part of the original sample and also perhaps from the local environment. Figure 2 shows the bottom tray of the chest and of the ten containers present it can be seen that five show a significant darkening/degradation of their parchment coverings. The sample (see Fig. 3) also has a partially darkened covering, showing that there has been some interaction between the inside of the container and the local environment via the semi-porous vegetable parchment paper.[19]

Oxidation products were found, the FAME GC-MS data giving a range of short carbon-chain dicarboxylic acids (C6:0 to C12:0, with a maximum at C9:0), and various oxo-/dimethoxy-/hydroxy-/dihydroxy derivatives of several saturated FAs. Dicarboxylic acids are formed by the oxidative cleavage of a carbon-carbon double bond of a longer carbon-chain FA. The predominance of the C9:0 dicarboxylic acid (and the presence of some mono-carboxylic C9:0 acid) suggests a 'parent' of oleic acid (C18:1). Thus we have fifteen oxidation products, to a total presence of 28.2%. Unsaturated FAs degrade faster that the saturated ones, and in our sample we have very little remaining unsaturated fatty acids (three isomers of C18:2 and the *trans*-9-isomer of C18:1, to a total of about 2.2%).[13]

My pattern of FAs (from the FAME GC-MS data) suggests the presence of an animal fat, i.e. palmitic acid (P, C16:0) and stearic acid (S, C18:0) being present in significant and similar amounts (i.e. a few tens of percent each) and smaller amounts (i.e. under 3% each) of (8) mostly even-numbered saturated FAs. The presence of C9:0 has already been explained, and the small amounts of the two other odd-numbered FAs (C17:0, straight and branched chain) are also suggestive of the presence of an animal fat in our original sample.[13,20,21,22]

A more detailed study of my FAME GC-MS data and the calculation of various FA ratios should help to distinguish ruminant from non-ruminant fat, and also perhaps determine if a mixture is present, such as two different fats or fat and oil. The ratios, and their various discriminatory values, used below are ones using only saturated acids. This was initially done because it was thought a) these acids degraded at a much slower rate than the unsaturated acids and b) that the acids used for a particular ratio degraded at about the same rate, and so their ratio value would not greatly change over time. However, it was later found, mostly from studies on artificially aged fats and oils, that saturated FAs can sometimes degrade/oxidise at different rates, where these rates depend critically on the sample's composition and local environment. The 'degree of robustness' of various ratios have been widely discussed, and so their results should be used cautiously, as 'indications' of what was present originally. If at all possible they should be used in conjunction with additional information.[22] Our (ratio) data below will therefore be interpreted in terms of the strength of the 'indications' of what were the original components in my sample, rather than giving definitive proof of their existence.

Perhaps the most well known FA ratio is Palmitic acid/Stearic acid (P/S, C16:0/C18:0). A 'cut-off' value of 1.3 is often quoted/used (but sometimes 1.0), where P/S > 1.3 suggests a non-ruminant fat and < 1.3 a ruminant fat. My ratio is 35.2/25.4, giving 1.4 and so indicating a non-ruminant fat (taken here to be pig fat – suet or lard).[20,21]

The next FA ratio is in fact a combination of two ratios: Stearic acid/Palmitic acid (S/P) and C17:0 br. (branched-chain)/C18:0. If S/P > 0.5 then (terrestrial) animal fat is suggested (if < 0.5 then plant oil or marine animal fat is suggested), and if C17:0 br./C18:0 is < 0.02 then non-



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ruminant fat is suggested (and > 0.02 suggests ruminant fat). Our values are: S/P = 0.7 and C17:0 br./C18:0 = 0.008; which again indicates a non-ruminant fat.[23]

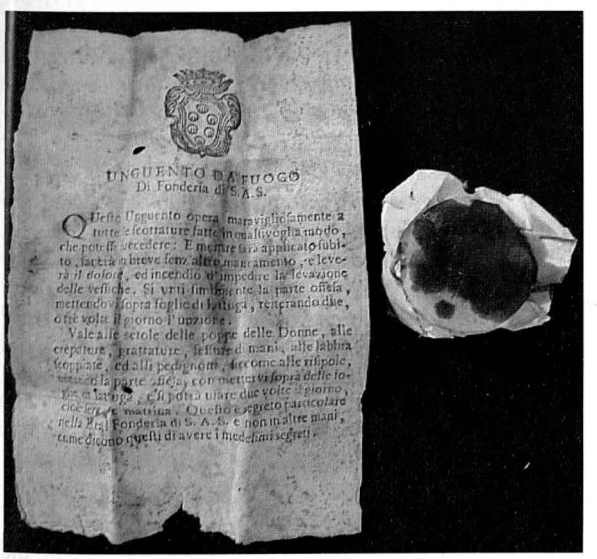
The last ratio is one combining six FAs. If the ratio (C15:0 + C17:0)/(C12:0 + C14:0 + C16:0 + C18:0) is >0.04 then ruminant fat is suggested and if < 0.04 then non-ruminant fat. Our value is 0.02, and so indicates once more a non-ruminant fat.[24]

Thus, overall, there are several indications for the presence of pig fat in the original sample. While one such indication should be treated with caution, it is felt that having *three* such indications adds strength to the interpretation.

Additionally, there are small amounts (< 3% each) of two unsaturated FAs present (three isomers of C18:2 and the trans-9-C18:1 isomer) and C16:0 (branched-chain). The source of these compounds is unclear, but they *could* indicate the additional presence of a plant oil and/or a ruminant (possibly dairy) fat.[17,20,24]

As already mentioned the results from FA ratios should ideally be combined with additional (analytical) information. Unfortunately it proved impossible to have other MS techniques applied to our sample (such as: gas chromatography-combustion-isotopic ratios mass spectrometry, GC-C-IRMS). However, the FA ratios results can also be interpreted contextually and be integrated with information from relevant old recipes found in pharmacopoeias published before the making of our original sample (i.e. late 17th century). Two such relevant old recipes were found:

'*Unguentum Pro Igne*' (ointment for fire, i.e. a burns ointment); two similar recipes from the 'Secreti Nobilissimi del Nuovo Autore detto il Greco' (Noble secrets by the new author known as 'The Greek') of 1641. The (red) colorant was always filtered beetroot juice; and both contained pork (suet) fat, common oil (olive oil) and new wax (beeswax). Additionally, one recipe contained some 'Silver Litargirium' (litharge, PbO, which is also red in colour).[25]


UNGUENTO DA FUOCO
Di Fonderia di S.A.S.

Questo Unguento opera marauigliosamente a tutte le ecottature fatte in qualunque modo, che potessi succedere: E mettendoui sopra subito, facia in breue senz'altro maneamento, e leuerà il dolore, ed incendio, impedire la leuazione delle vesiche. Si unti similmente la parte offesa, mettendoui sopra foglie di lattuga, reiterando due, otto volte il giorno l'unzione.

Vale alle sciole delle poppe delle Donne, alle crepature, frattature, fessure di mani, alle labbra stroppiate, ed alli pedignoni, e come alle rispole, mettendo la parte offesa, con mettervi sopra delle foglie di lattuga, e si potra vsare due volte il giorno, cioè sera, e mattina. Questo è segreto particolare nella Reg.l Fonderia di S. A. S. e non in altre mani, come dicono quelli di avere i medesimi segreti.

**Figure 3.** The covered glass container of the ointment, and its 'dosage leaflet' from John Clerk of Penicuik's medicine chest.

'*Unguentum Rosatum*' (rose ointment; used as an astringent and restorative for various skin diseases); one recipe from the *Pharmacopoeia Augustana* (by Adolfo Occo, 1524-1606) of 1597. Its deep red colour comes from rose water and (ground and macerated) fresh red rose petals; with pork (suet) fat and (sweet) almond oil, the latter being the smaller amount present.[25]

Given that my sample does *not* contain beeswax or litharge, then the recipe most comparable to mine is that for 'Unguentum Rosatum' above. Its usage is close to my sample (see below) and the main component is (very probably) pig fat. Almond oil could be present in my sample. However, some of the components of the red colorant (rose water/extract of red rose petals) are often subject to a degree of degradation (usually oxidation) over time, and so are not usually found.[18,25]

A translation of the 'dosage leaflet' for the burns ointment, found underneath its glass container (Fig. 3) in the bottom drawer of the medicine chest, is given below (and where the words in square brackets have been added by us):

> Ointment for burns
> Of the Fonderia [Foundry] of S.A.S.
> This ointment works wonderfully for all burns whichever way they could occur; and if [the ointment] is applied immediately, it will heal quickly with no need for other remedies, and will eliminate pain and the burning sensation preventing the eruption of blisters. Apply similarly to the offended part, covering with lettuce leaves, repeating the application two or three times a day.
>
> [This ointment] works for the chaps in a woman's nipples, for cracks of the hands, scrapes and fissures, for burst lips, and for frostbite of the feet, as well as for erysipelas [a severe contagious skin infection] lesions applying to the offended part, and covering with some lettuce leaves, and can be used twice a day, that is evening and morning. This is a special secret in the Royal Foundry of S.A.S. and not in anyone else's hands, as those who say to have the same secrets.

[S.A.S. is Sua Altezza Serenissima (His Most Serene Highness)]

The fonderia of the Grand Dukes of Tuscany was their workshop/laboratory for research into and the production of various materials relating to the Arts and to Alchemy. In addition to the initial furnaces for smelting and forging metals, there were added over time facilities for studying and making: medicines, porcelain, cabinets, confectionery, clocks and other mechanical devices, and for the cutting of precious/semi-precious stones. Its location varied over time; it being found, in chronological (if sometimes overlapping) order, in the Palazzo Vecchio (located at the NE end of the Uffizi gallery), the Casino di San Marco and in what is now the Uffizi gallery itself. However, from the time of the reign of Cosimo II (1590–1621; reigned from 1610) its prestige and facilities



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decreased and under his successor (Ferdinando II, 1610–70) its budget, and hence output, was increasingly reduced. Under Cosimo III (reigned 1670-1723) the fonderia was moved to the Palazzo Pitti where it apparently functioned only as a pharmacy.[26,27] The very existence of this chest and its contents confirms the above and also suggests an associated workshop for making the medicine chests and their distinctive 'dosage leaflets'.

Various fats and oils have been used in skin remedies for millennia (see previous Introduction and associated references[1-8]). The fats and oils were used to conserve the outer layer of the skin and to protect any broken areas whilst it healed; and some of their components' molecules, along with those of any added ingredient(s), could transfer into the skin. This transfer would be enhanced if the skin was broken. In Europe of the last few centuries, pig fat, almond oil and rose preparations have often been (individually or together) so used --- sometimes mixed with other materials, sometimes not.[6,18,25]

Historically almond oil has been used to treat skin conditions (such as psoriasis and eczema), and as an effective skin emollient. It is now thought to have anti-inflammatory, immunity-boosting and anti-hepatotoxicity effects, and is being considered for study for use post-operatively to reduce scarring.[28]

Dried rose petals were used in the past for skin care, and rose preparations were variously medicinally used, for example as: astringent, anti-bacterial agent, anti-septic and for their general cooling effects on damaged skin. Also, more recently, rose extracts/isolates have been tested for anti-HIV activity.[6,29]

It is unclear if the lettuce leaves, mentioned in the above 'dosage leaflet', were intended to have a pharmaceutical effect when used or if they were just for the convenience of covering the sticky ointment on the skin. Very recent work has shown that green lettuce leaves do contain bioactive compounds that have anti-inflammatory and anti-oxidant potential.[30]

Determining the original chemical composition of an 'ooze' that is over 300 years old was never going to be straightforward. As expected, there was a degree of degradation. Fifteen of the thirty molecules found (to a total presence of 28.2%) from the FAME GC-MS analysis were recognisable oxidation products of a fat or oil. This is consistent with the sample being kept in a warm and dry environment for about three centuries. From my results its original composition probably was: an animal fat, very likely pig fat, as the main component; a smaller amount of a plant oil and/or a ruminant milk fat; and a red colorant. However, if my analytical data is integrated with old relevant recipes then we should be able to see a little further. The relevant historical recipe in this case, from a pharmacopoeia probably consulted (or perhaps copied from) in the fonderia of The Grand Duke of Florence in the mid.-to-late 17th century, is that of 'Unguentum Rosatum' (Rose Ointment). This gives a better understanding of what my sample's original composition probably was, that is: pig suet fat as the major component, sweet almond oil as the minor component and the deep red colour from rose water/extracts. Thus history (historical recipes) augments chemistry (residue analysis).

Provided the skin area was clean then using the ointment as a covering for a burn or bruise would have been a good way to protect it from infection. Applying it for a severe skin affliction is more problematic, but using it would at least have contained the infection. The use of lettuce leaves to cover the ointment would at least have kept its 'stickiness' in check, and may even have aided recovery.

## Acknowledgements

I would like to thank the following people for their help with this project: Sir Robert Clerk of Penicuik for allowing access to the medicine chest; Ms Sally Pointer (an Independent Experimental Archaeologist) for taking the photographs used for Figures 1, 2 and 3 and also for opening the glass container and removing a small amount of sample; Dr. Anita Santorum for translations of old Italian; the staff of the Chemical and Materials Analysis Unit (University of Newcastle, UK) for the experimental LVSEM work; and the Hall Analytical Laboratories (Manchester, UK) for the two GC-MS analyses.

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*TIC GC-MS*: Sixteen compounds could be unambiguously resolved and identified from the collected data, three could not be identified ('unknown') and in one case there was an unresolvable combination of identified and unknown. In increasing order of retention time (in the GC tubular column), the seventeen compounds identified were: Octanal (C8 aldehyde, 0.6%); Nonanal (C9 aldehyde, 1.3%); Octanoic acid (C8:0, 1.6%); Nonanoic acid (C9:0, 4.1%); Decanoic acid (C10:0, 1.4%); unresolved Undecanoic acid and unknown (C11:0, to a total of 0.8%); Octanedioic acid (C8:0 dicarboxylic acid, 1.7%); Nonanedioic acid (C9:0 dicarboxylic acid, 2.0%); Tetradecanoic acid (C14:0, 3.7%); Decanedioic acid (C10:0 dicarboxylic acid, 0.5%); Pentadecanoic acid (C15:0, 0.3%); Hexadecanoic acid (C16:0, 56.6%); Heptadecanoic acid (C17:0, 1.3%); Octadecenoic acid isomer (C18:1 isomer, 3.2%); Octadecanoic acid (C18:0, 20.1%); Octadecadienoic acid isomer (C18:2 isomer, 0.4%) and Eicosanoic acid (C20:0, 0.3%). The sample was dissolved in dichloromethane (DCM) and after data collection the compounds were identified from a database library and/or by manual interpretation.
*FAME GC-MS*: The thirty fatty acids (or their derivatives) identified are given below in increasing order of retention time: Octanoic acid (C8:0, 0.8%); Nonanoic acid (C9:0, 2.3%); Decanoic acid (C10:0, 0.8%); Dodecanoic acid (C12:0, 0.1%); Hexanedioic acid (C6:0 dicarboxylic acid, 2.9%); Tetradecanoic acid (C14:0, 2.9%); 2-Hydroxydecanoic acid (C10:0 derivative, 0.3%); Heptanedioic acid (C7:0 dicarboxylic acid, 0.9%); 6,6-dimethoxyoctadecanoic acid (C18:0 derivative, 0.3%); 14-Methylpentadecanoic acid (branched C16:0, 2.4%); Hexadecanoic acid (C16:0, 35.2%); Octanedioic acid (C8:0 dicarboxylic acid, 6.1%); 14-Methylhexadecanoic acid (branched C17:0, 0.2%); Heptadecanoic acid (C17:0, 1.2%); Nonanedioic acid (C9:0 dicarboxylic acid, 9.8%); Octadecanoic acid (C18:0, 25.4%); unresolved *trans*-9-Octadecenoic acid and Decanedioic acid (*trans*-isomer of C18:1 and C10:0 dicarboxylic acid, to a total of 6.0%; where the *trans*-isomer is estimated to be about 1% and so the dicarboxylic acid is about 5%); 9-oxo-decanoic acid (C10:0 derivative, 0.2%); Octadecadienoic acid isomer (C18:2 isomer, at 0.2%, plus two later isomers at 0.4% and 0.6%, giving a total of 1.2%); Undecanedioic acid (C11:0 dicarboxylic acid, 1.3%); Eicosanoic acid (C20:0, 0.6%); Dodecanedioic acid (C12:0 dicarboxylic acid, 0.3%); Docosanoic acid (C22:0, 0.05%); 7-oxo-pentadecanoic acid (C15:0 derivative, 0.2%); unresolved 10-oxo-hexadecanoic acid and Dihydroxyoctadecanoic acid isomer (C16:0 derivative and C18:0 isomer derivative, to a total of 0.9%) and 10-oxo-octadecanoic acid (C18:0 derivative, 0.6%). This analysis was done in a standardised way, that is hydrolysis followed by formation of methyl esters. Thus any TAGs remaining would be hydrolysed and their component FAs identified, together with the FAs already formed (see above). If any reader wishes further details/discussions on these GC-MS analyses, then please contact the author.
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## *The Indian Lancet*

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When on superannuation as a pedagogue in 1988 I engaged in studies on the history of pharmaceutical and related developments in India, I was professionally mature. I noted more than two dozen topics and subtopics on which I would need to collect source material. On my visits to different archive centres within the country and abroad I looked for information on all the subjects in view. Some other areas not originally thought of but appearing of interest while on the job also became topics of equal attention. Studies on the history of certain obsolete journals was one such theme.

The oldest such periodical which came to my notice was the *Madras Quarterly Journal of Medical Science* at the Connemara Public Library at Madras (now Chennai). The journal started publishing in 1860, later changing to *Madras Monthly Medical Journal* in 1870 and ceasing to exist in 1873.[1] *The Indian Lancet,* tracing its first appearance as *The Medical Reporter* in 1892, is the subject of this paper.

At the College of Physicians in Philadelphia I was able to locate some issues of the *Indian Journal of Pharmacy* which had started publication in January 1894 from Calcutta.[2] *The Indian and Eastern Druggist,* starting publication in 1920, not from India but from London, appeared from Calcutta for about four years as *Indian and Eastern Chemist* from 1937 onwards.[3]

### *The Medical Reporter*

In the beginning of my studies on medico-pharmaceutical history of India, I came across a reference to a *Medical Reporter* citation, a journal which was unknown to me. My initial efforts to know about the periodical were fruitless and it seemed that mine was a wild-goose chase. However, later in the early 1990s when I was working at the National Library in Calcutta, a microfilm of the first five volumes of the journal became available. I had page prints made of the selected parts, from the Bhai Gurdas Library of the Guru Nanak Dev University at Amritsar. The collection gave me some useful source material.

*The Medical Reporter* started publication in January 1892 from 35 Wellington Street, Calcutta, with Lawrence Fernandez, MD, as the Editor and Proprietor.[4] It was felt that 'For some reason or other, we in India are almost


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totally devoid of medical literature and the spirit of independent medical journalism exists so feebly, that it has scarcely ever, even in a single instance, been able to plant itself on a firm basis, in the shape of a well supported and popular organ'.[5] The medical literature available mostly came from Europe. The existence of the *Indian Medical Gazette* from Calcutta was 'mainly attributed to the official recognition and support it received'. The other journal of the time was the *Indian Medical Record* also from Calcutta; it had been favourably received and was an independent organ. It was stated, 'We as advocates of independent medical literature, wish our contemporary many more years of independent successful existence; and enter upon the field of rivalry for benefiting medical science'.[5]

*The Medical Reporter* was well received and the editor recorded that 'We are glad to say our first two issues have been received with greater favour, and encouragement than we expected'.[6] The objective of the periodical remained 'the furtherance of *Medical Sciences,* especially as it refers to the tropics'.

On 1 January 1894 *The Medical Reporter* 'entered upon a new feature in its career: that from a monthly it has developed into a fortnightly at no extra cost to the subscribers'.[7] This was entirely due to the generous and encouraging support the journal had received. From now on they published two volumes a year for the periods January-June and July-December. From volume 2 to volume 6 the publication office was the Medical-Publishing Press, 5 Royd Street, Calcutta.

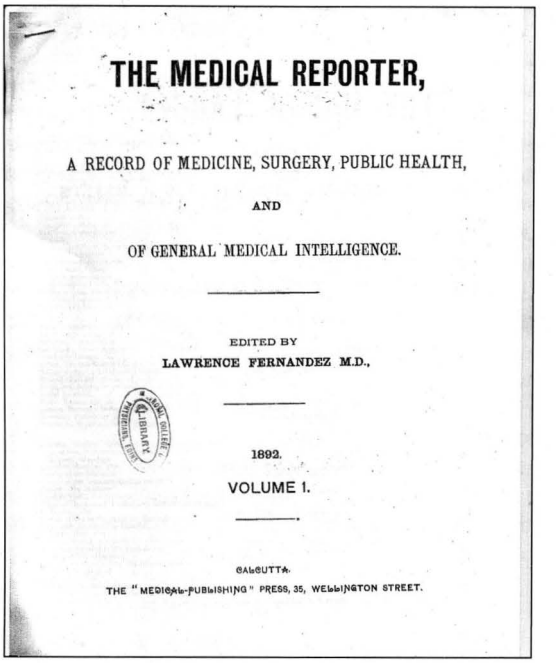
*The Medical Reporter* remained truly a Record of Medicine, Surgery, Public Health and of General Medical Intelligence, but off and on there appeared in it material which I found of interest for research as a historian of pharmaceutical and related developments in India of the colonial period. I noted down many references to the source material of interest and some of these I have already used for my writings.

For biographic coverage, supplementary information became available on active workers engaged in study and propagation of the *Indigenous Drugs of India*. These included Rai Bahadur, Kanny Lall Dey,[8] William Dymock,[9] Edward John Waring,[10] and Sir William O'Shoughnessy Brooke.[11] References to some other subjects were also collected.

## The Indian Lancet

By now I had come to know of the existence of *The Indian Lancet* and how the journal had been a continuation of *The Medical Reporter.* When I started working at the National Medical Library at New Delhi I could lay hands on volumes 6 (July-December 1895) to 16 (July-December 1900), eleven in the series. The popularity which *The Medical Reporter* had gained, prompted the editor to change the name to *The Indian Lancet* from 1 November 1895, adopting the Lancet part after the world famous general medical journal *The Lancet* (London).[12]

My search for more information on the journal had been an ongoing process all through. It was Geoffrey



THE MEDICAL REPORTER,

A RECORD OF MEDICINE, SURGERY, PUBLIC HEALTH,

AND

OF GENERAL MEDICAL INTELLIGENCE.

EDITED BY

LAWRENCE FERNANDEZ M.D.,



1892.

VOLUME 1.

CALCUTTA.

THE "MEDICAL-PUBLISHING" PRESS, 35, WELLINGTON STREET.

**Figure 1.** Title page of Volume 1 of *The Medical Reporter.*

Davenport of the Royal College of Physicians, London,[13] who provided me with relevant pages of the *World List of Scientific Periodicals,*[14] from which I learnt that the *Indian Lancet* was published from Calcutta during the period 1895-1908. Later, it was through correspondence with Ian Milne[15] and Estela Dukan[16] of the Royal College of Physicians of Edinburgh (RCPE) that much source material on *The Medical Reporter* and *Indian Lancet* was obtained. Dukan also brought to my notice a paper by Sanku Bilas Roy,[17] who had located volumes 12, 13 and 15 of *The Indian Lancet* in India.

The Library of the Royal College of Physicians of Edinburgh has in their possession the entire set of volumes of the *Medical Reporter* and up to volume 23 (1904) of *The Indian Lancet.* All that I needed for my studies was made available through correspondence.

*The Indian Lancet* continued to be edited by Dr Lawrence Fernandez and the press was now renamed as The "Indian Lancet" Press located at 5 Royd Street, later changing to 6 Royd Street from publication of volume 11; from volume 21 the location was 3 Wellesley Street. During 1897 the *Indian Lancet* office was damaged by an earthquake and for some weeks the work had to be carried out in a propped-up half-demolished building.[18] The journal remained a fortnightly publication, changing to a weekly from volume 17 (1901).

*The Indian Lancet* broadly remained the Journal of Medicine, Surgery, Public Health, and of General Medical Intelligence. The journal published some original research articles, current medical literature, special correspondence and 'a mirror of practices.' Each volume was divided into several chapters according to the month. At the end of each chapter, there were Government medical notifications which consisted of topics such as Gazette of India, Retirements, Appointments and Promotions in Medical Departments.



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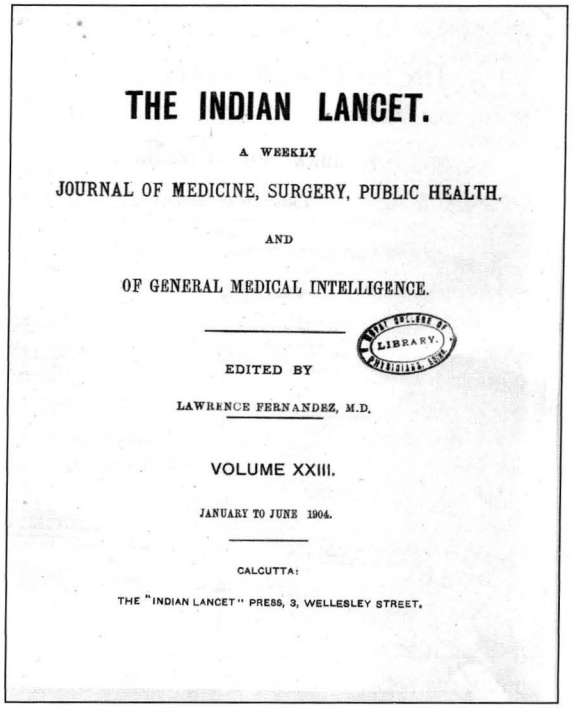

THE INDIAN LANCET.

A WEEKLY

JOURNAL OF MEDICINE, SURGERY, PUBLIC HEALTH,

AND

OF GENERAL MEDICAL INTELLIGENCE.



EDITED BY

LAWRENCE FERNANDEZ, M.D.

VOLUME XXIII.

JANUARY TO JUNE 1904.

CALCUTTA:

THE "INDIAN LANCET" PRESS, 3, WELLESLEY STREET.

**Figure 2.** Title page of Volume 23 of the *Indian Lancet.*

From *The Indian Lancet* volumes I noted down scores of references on topics such as biographies, cinchona plantations, botanical gardens, antiquity of Indian medicine and indigenous drugs, medical education, sales of poisons, drug adulteration, civil dispensaries, compounders, etc. I continue to use the appropriate source material for my writings.

By courtesy of the Royal College of Physicians of Edinburgh Library mostly I was able to make studies using material drawn from *The Indian Lancet* up to volume 23 (1904). Unsuccessful efforts were made to reach the remaining volumes of the periodical. Recently I learnt about likely availability of volumes from 1904 to 1908 at the Wellcome Library, London,[19] but my enquiry drew a blank from that end, their possession of the volumes was only up to 1903.[20]

The only biographical information I have found on Dr Fernandez has come through Estela Dukan.[21] Fernandez passed the Double Qualified Examination of the Royal College of Surgeons of Edinburgh and Royal College of Physicians of Edinburgh in 1885.[21,22] He also held MD from Brussels.[22] The entry in the Register of Licentiates of the Royal College of Physicians of Edinburgh shows his birth in India at 'Poodopat.'

It is interesting to note that Dr Fernandez disappeared from the Medical Register and Medical Directory around 1908, so he possibly died around that time.[21] This is understandable since Dr Lawrence Fernandez was not only the editor throughout but also the proprietor of the publication.

## Acknowledgements

My grateful thanks are due to all the institutions and individuals named in the text, who helped me in different ways during my two-and-a half decades long search for the source material pertaining to the subject.

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# The Rise and Fall of the Liverpool Apothecaries Company 1836 to 1904

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The first half of the nineteenth century, between the passage of the Apothecaries Act in 1815 and the foundation of the Pharmaceutical Society of Great Britain in 1841, was a formative and influential period in the history of British pharmacy. The Apothecaries Act had facilitated the transformation of the apothecaries into general medical practitioners who began to re-define the boundaries of their new roles. At the same time these shifting boundaries created opportunities for the growing numbers of chemists and druggists to establish themselves in retail and wholesale businesses. Many of these had little experience of business and no pharmaceutical qualifications of any kind.[1]

Around the country the different groups of health practitioner responded to the new situation in different ways and at different speeds. Liverpool during this period was a prosperous and bustling city. It had dominated the slave trade right up to the abolition of the latter in 1807, and it remained a major port for the arrival of sailing ships laden with cotton for the Lancashire mills, sugar for refining locally, along with tobacco and other commodities. In such a thriving city medical practitioners of all types were generally able to make a good living.

With little in the way of regulation it is hardly surprising that a proportion of the drugs supplied were of inferior quality, had been adulterated or had deteriorated with age. It was perhaps also inevitable that the new breed of apothecaries practising as general medical practitioners around the country recognised the opportunity to make additional profit by taking control of the supply of medicines for themselves and their colleagues by setting up their own manufacturing companies. And not surprisingly, such apothecaries soon came into conflict not only with the local chemists and druggists, but also with the local physicians and surgeons. In these battles the apothecaries were able to claim the moral high ground by emphasising that what motivated them was purely concern with the quality of the medicines available and not the profit to be made.

This paper describes the rise and fall of the short-lived Liverpool Apothecaries Company, from its origins in 1836, through to its demise in 1860.[2] The story takes in some early controversies in 1839 and 1840, an intervention from Jacob Bell in 1849, and the eventual takeover of the company. In fact the company never enjoyed the success its founders expected, and in 1860 it became the Liverpool branch of the General Apothecaries Company based in London. The branch itself went into liquidation in 1874, but the name of the Liverpool Apothecaries Company was resurrected as a Liverpool chemists business until the company was finally dissolved in 1904.

The Liverpool Apothecaries Company was not the first local Apothecaries Company to be established: that honour fell to Glasgow. The Glasgow Apothecaries Company was formed by a group of twelve medical practitioners in 1805, in Wilson Court in Argyle Street. They were concerned that most of their prescriptions were actually being dispensed at shops owned by other doctors, and they decided that the solution was to open their own business. Before long other doctors and chemists in the area used the company, and a wholesale department was opened. There are records showing that in January 1819 the Glasgow Apothecaries Company paid Howard's, who much later went on to manufacture aspirin, the sum of £213 for drugs.

Other Apothecaries Companies were formed, sometimes in the same city as existing ones. The New Apothecaries Company was established in 1824 in similar circumstances to the original Glasgow one by seven well-known physicians, including a Professor Rainey. The premises were in Glassford Street in Glasgow, and the first manager was William Grieg. He had served his apprenticeship with the Glasgow Apothecaries Company. The New Apothecaries Company was subsequently owned and managed by four generations of the Grieg family, before eventually being sold to Evans Medical in Liverpool.

The Liverpool Apothecaries Company, founded in 1836, was the next to be founded, but it was not the last. Although the supposed justification for its origin was concern with the adulteration of medicines, other factors included not only financial greed by the apothecaries but also local protests about the dominance of the London Society of Apothecaries.

## The problem of drug adulteration in the early nineteenth century

Concern about the adulteration of medicines continued for years after the Apothecaries Act of 1815. In 1825 a Dr Paris published a book entitled *Pharmacologia*,[3] in which he stated that 'the ignorant preparation and fraudulent adulteration of medicines deserve to be ranked amongst the most powerful causes which have operated in affecting the reputation of many medicinal substances'. He referred specifically to Peruvian bark which, he claimed, had fallen into total discredit in 1779, from its 'inability to cure the ague, and it was afterwards discovered to have been adulterated with bark of an inferior species'.

In 1833, three years before foundation of the Liverpool Apothecaries Company, a group of practitioners in Liverpool had protested, in a letter to *The Lancet*, against the Worshipful Society of Apothecaries of London being given control of medicine, and they had appealed for a repeal of the Apothecaries Act of 1815. They commented 'these men and their company are utterly unknown in the history of medicine and bear the same rank in medical sciences as does the Fishmongers Company in natural science or the Stationers Company in general literature'.[4]

In 1834 a Select Committee of the House of Commons was appointed to inquire into and report on medical



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education. In the course of the committee's enquiries abundant evidence was given 'of the truth of Dr Paris's allegations' about adulteration. The committee noted, however, that despite the evidence, no legislation had been passed for the protection of the public. There was no adequate existing means, they concluded, of ensuring the supply of pure medicinal substances and their 'due and faithful compounding according to the formularies or prescriptions of physicians'.

## Origins of the Liverpool Apothecaries Company

It was against this background that the Liverpool Apothecaries Company was founded, on 30 May 1836, with a capital of £100,000. It was an ambitious scheme. Its first task was to acquire land to build the substantial premises it would require. It purchased a plot at 4 Colquitt Street, at the corner with Wood Street in what is now central Liverpool. There it built a warehouse, chemical and pharmaceutical laboratories, and a retail shop; these were erected at a total cost of £30,000. The premises were known as the Liverpool Apothecaries Hall.

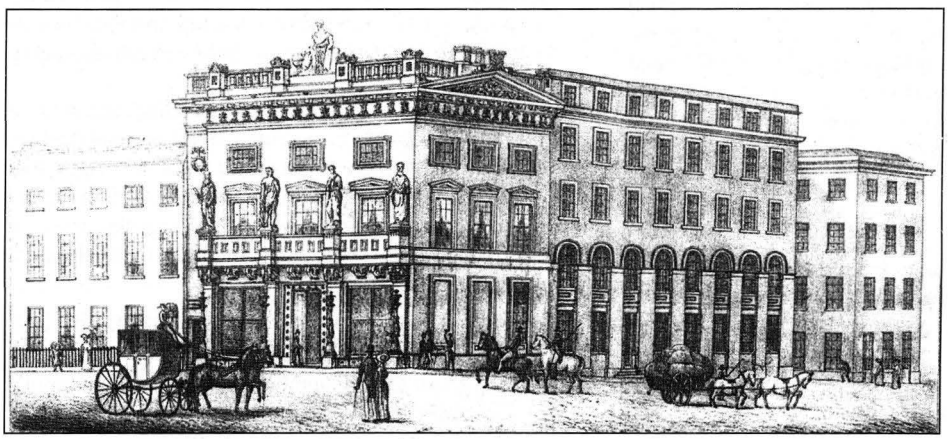

**Figure 1.** The Hall and Buildings of the Liverpool Apothecaries Company, corner of Colquitt Street and Wood Street, Liverpool.

In accordance with practice at the time Memorials (or testimonials) were presented to the Queen by the chairman and directors of the company.[5] This was the process by which the directors made application to Parliament for a Bill to give them the facility of suing and being sued in the name of their chairman, confirming their legal status. However, the Bill was opposed by the then President of the Board of Trade, who advised its withdrawal, recommending that the directors wait 'until the public should have experience of the working of the establishment'.

The directors could then apply for Letters Patent, in which the legislators would have the power of binding them to certain conditions. *Letters Patent* were a type of legal instrument in the form of a published written order issued by a monarch, generally granting an office, right, monopoly, title, or status to a person or corporation; they were used for the creation of corporations or government offices, or for the granting of city status or a coat of arms. However, as a result of the opposition of the President of the Board of Trade, the Bill was withdrawn.

The formal deed of constitution, dated 1837, gives the names of the directors, staff and trustees of the Company, together with details of its aims and organisation.[6] The first chairman was Andrew Gillon, a surgeon; four of the seventeen members of the board were physicians, five were surgeons, one was a broker and another was a merchant. Of the three trustees, one was a physician and another was a surgeon. Only one, Joseph Churton, was a Licentiate of the London Apothecaries. The manager was Robert Clay, the secretary Henry Forshaw and the traveller Mr M Chatterton.

In January 1838, when the Company had been in existence for 18 months, and (according to the memorialists) had 'acquired a reputation that ensured its usefulness', a deputation from the board of directors consulted the new President of the Board of Trade, the Rt Hon H Labouchere, who was then in Liverpool. Labouchere strongly recommended that they made immediate application for a grant of Letters Patent, giving them a monopoly. This they did, but the Letters were not granted.

The Company appears to have faced considerable opposition to its establishment, from several sources both local and national. Its supporters objected to the complaints about it being a 'monopoly' that were raised against it from several sources. The managing committee of the Druggists Association, headed by a wholesale dealer in Liverpool and backed by travellers employed by the larger wholesale houses of London, succeeded in raising petitions from various places against the granting of Letters Patent. And not surprisingly, the Solicitor of the Worshipful Society of Apothecaries of London opposed the name adopted by the Company.

Despite this vociferous opposition, the Memorials (or testimonials) contained many letters of support for the Company. These came from practitioners in various parts of Great Britain, including James Simpson in Edinburgh and Robert Keate, sergeant-surgeon to the Queen. Not surprisingly two of the Company's own staff, Dr RH Brett, the chemist and analyst, and Robert Clay, the manager, also wrote letters of support. But despite these efforts no Letters Patent were ever granted.



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## The Peruvian bark controversy 1839

The new Company was soon involved in the first of several controversies. On February 5 1839, it rather rashly offered a public challenge, that the bark in the Company's possession was genuine Loxa Peruvian bark, as proved incontrovertibly by its external characteristics and by the analysis of the Company's chemist. The challenge was accepted by someone using the pseudonym 'Oh' who issued a broadsheet addressed to 'the chairman of the Company assuming the title of the Liverpool Apothecaries Company, when it is a well-known fact that butchers, bakers, shoemakers, tailors or chimney-sweeps may, by holding shares in this speculation, with equal right and propriety, designate it after their particular or joint vocations'.

'Oh's' challenge was not that the bark was adulterated, but rather that any claim on the basis of a test by the Company's own chemist was invalid. 'Oh' claimed that the bark purchased by the Company had to be shown to be false by the 'real and legislatively authorised Apothecaries Company of London'. Despite the publicity given to the challenge at the time the outcome of the dispute is not known.

## *The Lancet* campaign 1839

Shortly afterwards, letters attacking the Liverpool Apothecaries Hall started appearing in *The Lancet.* The first was signed under the pen name 'Machaon' (in Greek mythology Machaon was the surgeon son of Asclepius and Epione).[7] It stated that in Liverpool 'a number of the physicians, surgeons and apothecaries ... have united in a joint-stock Company, with a host of unqualified individuals, and have, in imitation of the worthies of Rhubarb Hall, appropriated to themselves the specious title of 'The Apothecaries Company'.[7]

The letter went on to criticise the Company's pretence that its main concern was for the dispensing of genuine drugs, and securing the public against adulteration; and it alleged that the Company had become wholesale and retail vendors of all kinds of advertised nostrums.

A second letter, signed by 'a general practitioner,'[8] also called the assumption of the title a fraud, 'for that Company is composed of trading speculators of various grades and callings, the purchase and possession of shares being all that is required as the qualification of a director, whether the subject be a tailor, tinker, butcher or whatever else.' This letter also referred to the spurious bark controversy, and repeated the charge of selling quack and secret remedies.[8] It also appears that correspondence on the bark question had been previously published in the *Liverpool Mercury.*

The controversy rumbled on, but eventually the Company hit back at its critics. In a letter dated 21 May 1840, Clay, the manager, stated that he had been engaged in the business of chemist and druggist in Liverpool for the last 34 years, since 1806, and declared that 'the scientific and professional measures daily practised in the establishment of the Liverpool Apothecaries Company, with the view of securing pure drugs for medical purposes, are most necessary in order to protect the medical profession and the public from the adulteration practised in the manufacture, preparation and compounding of drugs'.

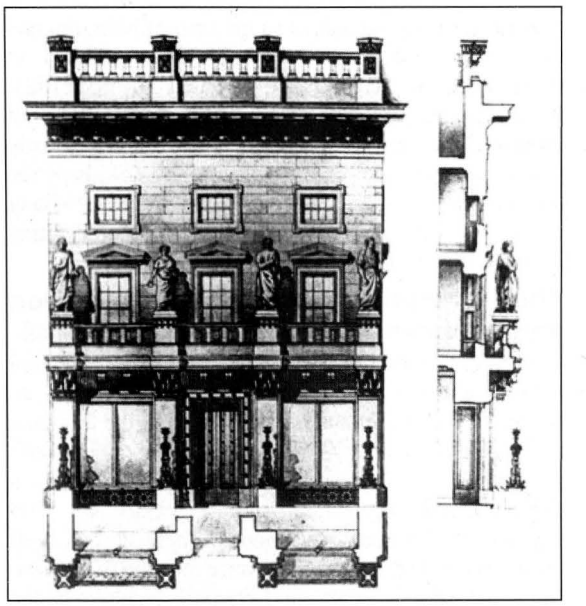

**Figure 2.** Front elevation of the Liverpool Apothecaries Company.

## David Waldie and the fires of 1845-46

The early years of the Company were further hindered by two fires in fairly close succession. The first, on 20 March 1845, involved the mill, but fortunately the main building containing the laboratories was separated from it by a street. But on 17 July 1846, the warehouse and laboratories were destroyed by a further fire. The damage was clearly extensive; none of the apparatus which had been used by David Waldie for his experiments on the manufacture of chloroform survived.[9]

David Waldie was a surgeon and apothecary, but his main interest was chemistry. In 1839 he replaced Dr Brett as chemist and analyst to the Liverpool Apothecaries Company, giving up his medical practice in the process. He found that the quality of chloroform in use from 1836 was variable, and he set about preparing a purer form. He met Dr James Young Simpson in Edinburgh in 1847 and promised to send him some of the pure liquid on his return to Liverpool. But the fire meant that he could not do so, and it seems Duncan Flockhart and Co. in Edinburgh obtained Waldie's method from Simpson, who then obtained supplies from them.[10]

Simpson acknowledged Waldie's contribution to the successful use of chloroform as an anaesthetic in a footnote to a paper he published on 15 November 1847,[11] but unfortunately omitted such reference in subsequent publications. There has since been widespread recognition that Waldie did not receive the credit he deserved for the introduction of chloroform into anaesthesia.[12]

Waldie himself continued his work at the home of his friend John Abraham in Liverpool. However, in 1853 he



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took up the post of chemist to the firm of Malcolm and Co. in Calcutta, India, although he continued to correspond with Abraham until the latter's death in 1881. It seems that Waldie also remained friendly with Simpson; he does not seem to have been greatly concerned about the claims for recognition of his part in the introduction of chloroform into anaesthesia. He later founded his own firm of analytical and manufacturing chemists near Calcutta, where he died in 1888.[13]

## The Liverpool Chemists' Association and the intervention by Jacob Bell 1849

One thing working in the favour of the new Liverpool Apothecaries Company was the lack of unity displayed by the local chemists and druggists. Before the founding of the Pharmaceutical Society of Great Britain in 1841 the chemists and druggists of Liverpool had been a disparate and disorganised group.[14] Prior to 1849 attempts to form an association of chemists had been unsuccessful; in that year, however, a meeting of between forty and fifty chemists in Liverpool resulted in the formation of the Liverpool Chemists' Association.[15]

This name was chosen in preference to the title Liverpool Branch of the Pharmaceutical Society in order to encourage those engaged in the profession, but not members of the Pharmaceutical Society, to join.[16] Some years later, in 1922, it was decided to form a branch of the Pharmaceutical Society within the Association consisting of pharmacists who were already members of the Pharmaceutical Society. After this time the name of the association was expanded to indicate its dual purpose; it became the Liverpool Chemists' Association and Liverpool and District Branch of the Pharmaceutical Society of Great Britain.[17]

In 1849 Jacob Bell, a leading figure in the Society in London at the time, was invited to address a meeting of the newly formed Liverpool Chemists' Association. But he succeeded in misjudging the relationship between the apothecaries and the chemists and druggists locally, and in so doing he managed to start another controversy for the Liverpool Company. The theme of his address was the connection between education and protection, and to illustrate it he referred to the Apothecaries Hall of Liverpool as being a concern which was, he claimed, probably 'insignificant and reported to be on its last legs', but which had nevertheless 'occasioned some degree of annoyance and injury to the chemists of the locality.' He commented that the pretext on which the Company was founded had been the allegation that medical practitioners could not depend on the accuracy of chemists, or on the purity of their drugs, and that it was therefore necessary for the safety of the public for the apothecaries to form their own Company.[18]

Bell acknowledged that this was something of a sweeping statement, but it was not one that could easily be refuted. Unfortunately it could not be denied that many persons were carrying on businesses as chemists and druggists who had had no education and whose drugs were bad and adulterated. Changing this situation necessitated legislation to create acceptable standards of

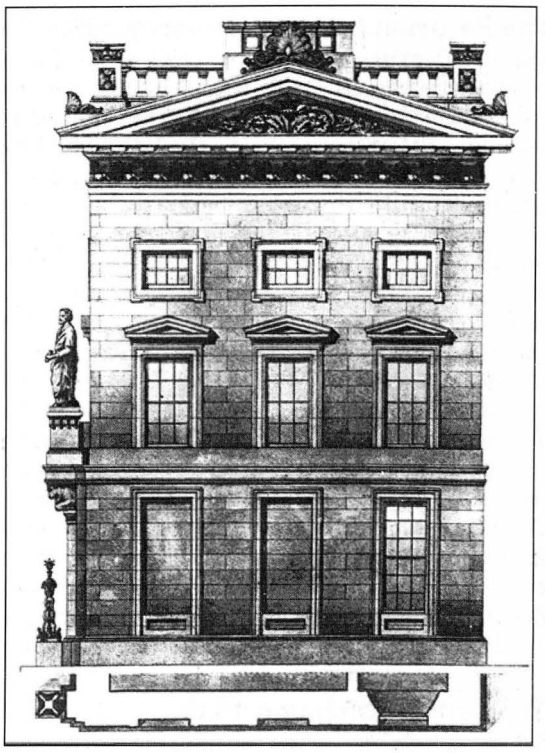

**Figure 3.** Side elevation of the Liverpool Apothecaries Company showing Wood Street facade.

education and qualification. His outburst was just one more episode in his long campaign to regulate the qualifications of pharmaceutical chemists. On 12 June 1851 he introduced a bill in the House of Commons to this effect, along with other proposals relating to the practice of pharmacy. The bill eventually became the Pharmacy Act of 1852.

Not surprisingly the Liverpool Apothecaries Company resented the imputation of being 'insignificant and on its last legs', and their then manager, a Dr Joseph Anderson MD, wrote a long letter to the *Pharmaceutical Journal*, pointing out Bell's inconsistency in stating that the charge of the unreliability of drugs was unfounded, but was at the same time impossible to repudiate.[19]

Bell, who was also the editor of the *Pharmaceutical Journal* at the time, published the letter, but added three pages of justification for his views.[20] Whilst apologising for his incautious remark about the financial state of the Company, he expanded on his theme about the need for education, which would have rendered the foundation of the Company unnecessary. For good measure he made scathing references to the two fires that had occurred at the Liverpool Apothecaries Hall, and other remarks which would today be regarded as libellous. It is surprising that the controversy appears to have gone no further.

Bell's response also revealed that the petitions of the Company for Letters Patent had been unsuccessful because of the opposition of the Liverpool chemists. His attack and his later statement reveal an uncharacteristic lack of preparation and judgement, because there is considerable evidence of cordial relations between the


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Liverpool Apothecaries Company and the Liverpool Chemists' Association. Robert Clay, the Company's manager, was president of the Liverpool Chemists' Association at the time of the controversy and in the following year; and John Abraham, who was also employed by the Liverpool Apothecaries Company, was president of the Association in 1856-57, and again in 1870-71.

Members of the two organisations frequently spoke at each other's meetings. In his presidential address in 1869 Abraham said that 'Dr Richard Brett was one of our earliest lecturers, and Mr David Waldie (Dr Brett's successor as chemist to the Company) delivered the first lecture addressed to us'.[21] These lectures were held in the Liverpool Royal Institution, which was also in Colquitt Street. Bell's intervention does not seem to have done much for relations between the two, and it doubtless took some time for the damage caused by Bell to be repaired.

## The final years

The failure to obtain Letters Patent and hence a monopoly of supply meant that the Liverpool Apothecaries Company always struggled to make much of a return for its investors, selling its products either locally or further afield. To make matters worse other competitors entered the market. In 1856 a General Apothecaries Company was founded in London, at a time when the Worshipful Society of Apothecaries at Blackfriars was itself a substantial manufacturer of medicines.[22] Rather than continuing to compete with the Liverpool Company, the General Apothecaries Company approached it with a view to amalgamation. After protracted discussions this finally occurred in 1860.

The Liverpool Apothecaries Company was formally dissolved and reconstituted as the Liverpool branch of the General Apothecaries Company. The first mention of the new Liverpool branch of the Company appears in a Minute Book on 18 February 1860, when the profit for the half-year was reported as £155 19s. 2d., an increase of £35 10s. 7d. on the previous half year. Amongst the shareholders listed for the new company was Joseph Anderson MD, previously manager of the Liverpool Company and now a director of the new one. The General Apothecaries Company also opened a branch in Birmingham for a short time.

Creation of the new enlarged General Apothecaries Company entailed the dissolution of the old company and the creation of a new one. A Notice appeared in *The London Gazette* dated 2 April 1861, under the heading 'General Apothecaries Company (Limited), No. 49, Berners Street, London, and No. 4 Colquitt Street, Liverpool. Completely registered, 9th October 1856'.

Liquidators had been appointed at an Extraordinary General Meeting held on 28th April 1860 to wind up the affairs of the old company. Notice was now given that another 'Extraordinary General Meeting of the shareholders will be held at No. 49 Berners Street, London, on Saturday 4th May 1861, at one o'clock, pm, for the purpose of considering the Liquidators' account, and if the Meeting is of the opinion that the affairs of the Company have been fairly wound up, to pass a resolution to that effect'.[23]

The Liverpool branch of the General Apothecaries Company survived for another fourteen years. A reference to the issue of the final liquidation account of the Liverpool branch of the Company appeared in March 1874. It showed that the net result of the sale of the lease, fittings, furniture, stock and book debts was £1,271 14s. 9d. and that the net loss in trading was £2,059 6s. 7d. The Liverpool Apothecaries Company thus closed through no fault of its directors after a quarter of a century of business, although the name itself survived for another thirty years.[24]

Revised Articles, Rules and Regulations for the General Apothecaries Company, which now operated only in London, were published on 18 April 1888.[25] As the Company was no longer trading in Liverpool it could have no objection to allowing the name of The Liverpool Apothecaries Company to be used by a retail chemists' business in Liverpool using the Colquitt Street premises. It seems likely that the name of the company was sold along with the lease to the premises and the furniture and fittings. The new business was later run as a partnership between three chemists and druggists, although only one of them gave their address as 4 Colquitt Street; this was W R Roberts, who had registered on 26 April 1882. Of his partners A M Hugill, who gave his address as 50 Lord Street, Liverpool, had registered three years earlier, on 18 June 1879, and J Overton, whose address was given as 50A Lord Street, had registered five years before that, on 15 May 1874.

This business continued until 1904 when it was dissolved, and the name finally ceased to be used. A Notice appeared in *The London Gazette of* 31 May 1904, indicating that 'the Partnership heretofore subsisting between us the undersigned, Arthur Major Hugill, John Overton, and William Rowe Roberts, carrying on business as Chemists, at 4, Colquitt Street, Liverpool, in the county of Lancaster, under the style or firm of *'the Liverpool Apothecaries Company,'* was dissolved as and from the twenty-second day of May, 1904, by mutual consent. Dated the twenty-seventh day of May, 1904.' The names of all three appear on the 1903 Register of Chemist and Druggists.[26]

The General Apothecaries Company itself, based in London, went on to continue in business until 1959, when it too went into voluntary liquidation. The Liverpool Apothecaries Hall building remained in existence until 1941. In 1934 a reporter noted that it had 'fallen on evil times' and was then used by the Burlington Rooms and Cafe. Later it was used as a warehouse by Morton's, a very high class furnishers in Bold Street. But in the May blitz of 1941 the old Liverpool Apothecaries Hall was completely destroyed by a land mine, and the site was later occupied by one of the factories of Wetheralls, who made camping gear and overalls.

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A shorter version of this paper was presented at the BSHP Annual Conference 2014, Liverpool .



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Julia Sheppard gave a talk on 'The Forgotten partner: Silas M Burroughs at the 8 February evening meeting at East Smithfield.


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